

We claim:

1. A polymer for delivery of a polynucleotide to a cell comprising: a polyvinylether.
2. The polymer of claim 1 wherein the polymer is cationic.
3. The polymer of claim 1 wherein the polymer is amphiphilic.
4. The polymer of claim 3 wherein the polymer is membrane active.
5. The polymer of claim 2 wherein the polymer interacts with a nucleic acid via electrostatic interaction.
6. The polymer of claim 6 wherein the polymer condenses the nucleic acid.
7. The polymer of claim 1 wherein the polyvinylether contains monomers selected from the list consisting of: alkyl vinyl ethers, positively charged vinyl ethers, negatively charged vinyl ethers, and aryl vinyl ethers.
8. The polymer of claim 1 wherein the polynucleotide is covalently linked to the polymer.
9. The polymer of claim 9 wherein the covalent linkage is labile.
10. The polymer of claim 11 wherein the functional group is selected from the list consisting of: targeting group, interaction modifier, steric stabilizer, and membrane active compound, affinity group and reactive group.
11. A composition for delivery of polynucleotide to a cell comprising: the polynucleotide and a polyvinylether.
12. The composition of claim 13 wherein the polynucleotide is associated with the polyvinylether via an electrostatic interaction.
13. The composition of claim 13 wherein the polynucleotide is associated with the polyvinylether via a covalent linkage.
14. The composition of claim 15 wherein the polynucleotide is associated with the polyvinylether via a labile covalent linkage.
15. The composition of claim 13 wherein the polyvinylether consists of a cationic polyvinylether.
16. The composition of claim 13 wherein the polyvinylether consists of a amphiphilic polyvinylether.
17. The composition of claim 13 wherein the composition further comprises: a maleic anhydride modified polyvinylether.
18. The composition of claim 19 wherein the modified polyvinylether consists of a anionic polyvinylether.

21. The composition of claim 19 wherein the modified polyvinylether consists of a amphiphilic polyvinylether.
22. The composition of claim 13 wherein the polynucleotide is selected from the list consisting of: DNA, plasmid DNA, linear DNA, dsDNA, ssDNA, RNA, expression cassette, antisense oligonucleotide, siRNA, microRNA, RNA expression cassette, ribozyme, dsRNA, and synthetic polynucleotides.
23. The composition of claim 22 wherein the polynucleotide expresses a protein.
24. The composition of claim 22 wherein the polynucleotide expresses an RNA.
25. The composition of claim 22 wherein the polynucleotide inhibits expression of a gene in the cell.
26. The composition of claim 13 wherein the polyvinylether consists of a modified polyvinylether.
27. The composition of claim 26 wherein the modified polyvinylether consists of an anionic polyvinylether.
28. The composition of claim 27 wherein the polyvinylether consists of an amphiphilic polyvinylether.
28. The composition of claim 26 wherein the modification consists of a reversible modification.
29. The composition of claim 26 wherein the polynucleotide is covalently linked to the polyvinylether.